

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 0000053993	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/EP 03/11371	International filing date (day/month/year) 14/10/2003	(Earliest) Priority Date (day/month/year) 21/10/2002
Applicant BASF AKTIENGESELLSCHAFT		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :



contained in the international application in written form.



filed together with the international application in computer readable form.



furnished subsequently to this Authority in written form.



furnished subsequently to this Authority in computer readable form.



the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.



the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.



as suggested by the applicant.



because the applicant failed to suggest a figure.



because this figure better characterizes the invention.

1



None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No

/EP 03/11371

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 B29B7/42 B29C47/64

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 IPC 7 B29B B29C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 447 156 A (CSONGOR DESIDER G) 8 May 1984 (1984-05-08) column 2, line 65 -column 3, line 4 column 3, line 50 -column 4, line 52; figures 1,4	1-9
A	DE 27 22 933 A (GRUENSCHLOSS EBERHARD DIPL ING) 23 November 1978 (1978-11-23) claims 1-4; figure 9	1,7,9

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

* & * document member of the same patent family

Date of the actual completion of the international search

13 April 2004

Date of mailing of the international search report

20/04/2004

Name and mailing address of the ISA

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

EP 03/11371

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
US 4447156	A	08-05-1984	US	4749279 A		07-06-1988
			US	4697928 A		06-10-1987
DE 2722933	A	23-11-1978	DE	2722933 A1		23-11-1978

We claim:-

1. A mixing device comprising a shaft (1), a front ring (2),
5 which is positively and non-positively connected to this shaft, an end ring (3), which is positively and non-positively connected to the shaft at a distance A from the front ring, and a loose mixing ring (4), which is freely rotatable and can be moved back and forth between the front
10 ring and the end ring, wherein

the front ring and the end ring in each case have at least one channel (2k) or (3k), respectively, which runs axially parallel, at an angle in relation to the axis of the shaft or
15 helically, and has in each case at least two regions (2b₁ and 2b₂) or (3b₁ and 3b₂) of different outside diameters, of which the region with the smaller outside diameter (2b₂) or (3b₂) is respectively located on the side facing the mixing ring, and

20 the mixing ring has a first region (4b₁) in which its inside diameter is large enough for it to be able to overlap with the region of smaller diameter of the front ring (2b₂), has an adjoining region (4b₂) in which the mixing ring has on its inner side at least one channel (4k) which runs axially
25 parallel, at an angle in relation to the axis of the shaft or helically, and also an adjoining third region (4b₃), in which its inside diameter is large enough for it to be able to overlap with the region of smaller diameter of the end ring (3b₂) and the mixing ring is so long that, in its respective
30 end positions, the other of the two rings (2) or (3) respectively is partially overlapped.
2. The device as claimed in claim 1, wherein the mixing ring has on its inner side at least one channel (4k) which runs
35 axially parallel.
3. The device as claimed in at least one of claims 1 and 2, wherein the mixing ring has on its inner side at least two channels (4k) which run axially parallel and are arranged
40 offset in relation to each other.
4. The device as claimed in at least one of claims 1 to 3,
45 wherein the shaft has a smooth surface on the section between the front ring and the end ring.

14

5. The device as claimed in at least one of claims 1 to 4, wherein the shaft has at least one circumferential channel (1k) on the section between the front ring and the end ring.
- 5 6. The device as claimed in at least one of claims 1 to 5, wherein the device can be connected on both sides to an adjacent device.
7. The use of the device as claimed in at least one of claims 1
10 to 6 as a mixing element in a screw machine.
8. The use of the device as claimed in claim 7 in connection with a screw tip (5).
- 15 9. A screw machine, comprising at least one device as claimed in at least one of claims 1 to 6.

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